Artificial Intelligence in Cancer Research and Precision Medicine.

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Abstract

Artificial intelligence (AI) is rapidly reshaping cancer research and personalized clinical care. Availability of high-dimensionality datasets coupled with advances in high-performance computing, as well as innovative deep learning architectures, has led to an explosion of AI use in various aspects of oncology research. These applications range from detection and classification of cancer, to molecular characterization of tumors and their microenvironment, to drug discovery and repurposing, to predicting treatment outcomes for patients. As these advances start penetrating the clinic, we foresee a shifting paradigm in cancer care becoming strongly driven by AI. SIGNIFICANCE: AI has the potential to dramatically affect nearly all aspects of oncology-from enhancing diagnosis to personalizing treatment and discovering novel anticancer drugs. Here, we review the recent enormous progress in the application of AI to oncology, highlight limitations and pitfalls, and chart a path for adoption of AI in the cancer clinic.